ELECTRIC BALANCE FOR CORRECTING MISLOADING THEREOF

This application is a continuation of Ser. No. 08/397,958, filed Mar. 3, 1995, now U.S. Pat. No. 5,847,328.

The invention relates to an electronic balance for loading, having a balance scale, weighing system, display, control keyboard and a digital processing electronic circuitry in which circuitry at least one memory is present for the weighed value shown in the display.

BACKGROUND OF THE INVENTION

Balances of the type with which the present invention is concerned are generally known and are described e.g. in DD 265 229.

A disadvantage of the known balances is the fact that when loading a balance with a formulation an inadvertent overloading of a component is difficult to cancel. In general, the attempt is made in this instance to retrieve the overloaded portion of the mixing vessel. Which, however, works somewhat only in the case of granular components but becomes difficult in the case of viscous components and is virtually totally impossible in the case of liquid-like components, which mix very rapidly. In addition, there is the danger in all cases that previous components are inadvertently removed also, which completely adulterates the formulation and, when the removed substance is reused, for instance, the next formulation is adulterated. In order to avoid this problem large, computer-supported loading systems have the possibility of rectifying overloads by also overloading the other components in the same proportion to maintain appropriate proportions. To this end the balance or the thereto connected computer calculates the percentage of overloading and alters the sensitivity of the balance for the following components in such a manner that the given mixing ratio is continuously observed and only the total amount resultant is somewhat higher. The components before the overload must naturally be subsequently dosed. However, a prerequisite of this method is that the balance or the computer knows both the theoretical weight as well as the loaded actual weight and can calculate the percentage overloading therefrom. However, this prerequisite is not given in the case of simple balances without an appropriate connection to a computer and without a recipe or formulation memory inside the balance.

The balance in DD 265 229 solves the problem of overloading by means of a memory with associated assumption key, associated zeroizing key and associated tare display unit for each component of the formulation. Therefore the actual value of each component can be individually stored and displayed and as a result an overloading of a component can be rectified or corrected by a corresponding, appropriate overloading of the other component. However, the plurality of operating keys and displays renders the balance complex i.e. difficult to read, difficult to operate and expensive to manufacture. In spite of the considerable expense such a balance is not capable of calculating the amount of material of the components to be subsequently added, which has to be done manually with external calculating aids, which readily lead to errors.

The present invention has the object of creating a possibility also for simple loading balances without electronic formulation or recipe memory of compensating an inadvertent overloading of a component by means of an equivalent percentage overloading of the remaining components.

The present invention achieves this in that a first additional key is present in the control keyboard upon the actuation of which key the weighed value shown in the display and stored in the digital signal processing electronics is decreased and upon the first actuation of which key the weighed value displayed immediately previously is taken in addition into a first additional memory within the signal processing circuitry, that a second additional key is present upon its actuation the weighed value displayed in the display is taken into a second additional memory within the signal processing circuitry and that the digital signal processing circuitry calculates the percentage deviation from the difference of the values stored in the two additional memories relative to the value in the second additional memory and alters the sensitivity of the balance for the remaining to-be-added components by this percentage.

The balance operator can decrease the display from the too large actual value step-by-step to the correct theoretical value with the decrease key. Since the overloading is generally only a few numerical steps of the balance display, this can be achieved relatively easily with a few steps. As a result of storing the balance display prior to the decreasing and at the conclusion of the decreasing the balance can calculate the percentage overloading and subsequently bring about the identical overloading with regard to the remaining components in a known manner.

BRIEF DESCRIPTION OF THE INVENTION

The invention is described in the following using the schematic figures and the course of its operation is explained thereby.

FIG. **1** shows a perspective external view of the balance.

FIG. **2** shows a section through he mechanism of the balance and a block circuit diagram of the electronic circuitry.

FIG. **3** shows the balance display during the subsequent loading of a second component.

FIGS. **4***a* and **4***b* show a flow chart of the course of a dosing.

The balance in FIG. **1** consists of a housing **20**, balance scale **3** for receiving the material to be weighed, display **19** for showing the measured results and for operator guidance, as well as of several operating keys **21** to **26**. Key **21** serves for zeroizing the display (tareing). Keys **22** to **26** are explained further below in the description of the dosing process.

FIG. **2** shows a section through the weighing system in an exemplary embodiment and a block circuit diagram of the associated electronics circuitry. Balance housing **20** and the voltage supply of the electronic circuitry have been omitted for the sake of clarity.

The weighing system consists of a system carrier **1** fixed to the housing, to which carrier load receiver **2** is operably secured so that it can move vertically via two guide rods **4**, **5** with moving joints **6**. Load receiver **2** carries load scale **3** for receiving the material to be weighed in its upper part and transfers the force corresponding to the mass of the material to be weighed via coupling element **9** with relatively thin areas **12**, **13** onto the load arm of translation lever **7**. Translation lever **7** is mounted by cross spring joint **8** to system carrier **1**. A coil body with coil **11** is fastened to the compensation arm of translation lever **7**. Coil **11** is located in the air gap of permanent magnet system **10** and generates the compensation force. The magnitude of the compensation current through coil **11** is regulated thereby in a known manner by position sensor **16** and automatic gain control amplifier **14** in such a manner that equilibrium prevails